JPRS 82727

25 January 1983

West Europe Report

SCIENCE AND TECHNOLOGY

No. 135

FBIS FOREIGN BROADCAST INFORMATION SERVICE

NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

JPRS 82727

25 January 1983

WEST EUROPE REPORT

SCIENCE AND TECHNOLOGY

No. 135

CONTENTS

BIOTECHNOLOGY

NEW COMPANIES, GOVERNMENT SUPPORT OF BIOTECHNOLOGIES IN UK

Puteaux BIOFUTUR in French Sep 82 pp 14-15

[Text] Agritech: The British Technology Group (BTG) and the Agricultural Research Council (ARC) hope to set up this structure (based on genetic engineering in the agricultural field) before the end of 1982. Financing in the amount of $10 million (1/3 from BTG and 2/3 in private funds) is planned. The company should establish links with ARC comparable to those Celltech has with the Medical Research Council.

Cambridge Biotechnology Laboratories (CBL), a subsidiary of Uniscience of Cambridge (formerly a distributor for Bethesda Research Laboratories) now markets its own products (basically enzymes and instruments used in genetic engineering). CBL will operate the pilot fermentation plant of the Imperial College of Science and Technology (ICST). Built in 1960, the facility houses fermenters with a capacity ranging from 5,000 to 3,000 liters. It will be modernized and adapted to present market demands by Imperial Technology.

Recently created (See BIOFUTUR No, 4), this company offers its services to concerns which do not have the necessary industrial structures to develop their own products. Celltech and Cambridge Life Science are two potential clients (Cambridge Life Science specializes in the production of urokinase and in the development of enzymatic tests for detection of pharmaceutical substances by combining enzyme-immobilization and microelectronic techniques.)

Government--Universities--Industry

Government support to new biotechnology companies: Budget increased by $2.67 million, $1.3 million for the Product and Processes Development Board.

Kenneth Baker (Information Minister for Technology) announced in mid-April the creation of an interdepartmental committee (headed by Ronald Coleman, chief of the Laboratory of the Government Chemist) for the development of industrial applications. Memberships in this new committee includes MRC, ARC, the Science and Engineering Council, the British Technology Group, the Public Health Laboratory Service, and the Centre for Applied Microbiology and Research. Among other things, R Coleman hopes to preserve and develop British banks of bacterium stocks, especially those of industrial significance. The role of this interdepartmental committee is to coordinate the interests of the

Department of Industry and other government departments with those of industry and universities. Plans are under consideration for joint work with the West German Ministry of Research and Technology.

The Biotechnology Directorate (recently created by the British Technology Group and the Science and Engineering Research Council) will study the procedures whereby basic basic university research results will be transferred to industry, and international agreements.

Twelve companies participate in the government efforts to support biotechnology, including Beecham, Wellcome, Unilever, Shell U.K., and Glaxo.

Private funds thus granted to the Science and Engineering Research Council (SERC) would amount to $2 billion per year, and could double in 2 years. SERC President Geoffrey Potter indicates that the Council annually spends $1.75 million for biotechnology (1/3 in applied research and 2/3 in basic research). A budget of $4.45 million is planned for research with potential industrial applications in 1985.

Governmental provisions relative to the universities were disclosed in mid-May. The University Grant Committee (UGC) will grant $1.4 million annually for 3 years to 8 universities, including the University College, London, the University of Birmingham and the Manchester Institute of Science and Technology. These monies will come from the 1982-1983 budget ($87.5 million) set aside for the reorganization of the university system. The UGC hopes to strengthen the university-industry ties and to prevent, after the previously imposed budgetary restrictions, universities from cutting credits to all their research programs instead of establishing priorites. In April 1983, the University College, London, received $7 million from Sandoz (Switzerland) to support a research project in brain biochemistry for therapeutic application, and $410,000 from Endorphin Inc., U.S.A. (See BIOFUTUR No 4). Private as well as UGC funds will benefit mainly two departments: biochemistry and genetic engineering.

12215
CSO: 3698/105

BIOTECHNOLOGY

TRANSGENE HAS GOOD REPUTATION IN BIOTECHNOLOGY INDUSTRY

Paris LE NOUVEL ECONOMISTE in French 22 Nov 82 p 49

[Article by Sophie Seroussi]

[Text] After production of "Pasteur" interferon was halted in June, it was blacklisted by the Ministry of Health. Four patients suffering from incurable cancers died from heart failure while being treated with injections of interferon.

There is no proof that the interferon, produced by the Pasteur Production Institute (IPP), caused these deaths. But this decision, taken as a precaution, only reinforces the hopes of manufacturers, who had long preferred to rely on genetic engineering for the production of this drug--less and less a miracle.

For there is not one, but several interferons; not one, but several production techniques. So-called "alpha" interferon is produced at IPP, obtained by culturing white cells extracted from blood salvaged in transfusion centers. More than the interferon itself, it is the method of purifying the product which may well be questioned again in coming months.

In fact, no accident, comparable to those deplored in France with "Pasteur" interferon, has been reported abroad. On the other hand, interferon produced by genetically reprogrammed bacteria does not have this kind of drawback. It is, by definition, absolutely pure. This is the method chosen by the leading French genetic engineering company, Transgene. In cooperation with Roussel-Uclaf, it produces so-called "gamma" interferon, which also probably has an immunological effect and is probably anticarcinogenic as well, making it more important than the other types of interferon. Another success to Transgene's credit: the development, the first of its kind worldwide, of a vaccine against rabies, by genetic recombination. Still in the testing stage, these two promising research methods demonstrate that French bioindustry is not without assets. At Transgene, they also appear optimistic ... and reserved. Mr Etienne Eisenmann, P-DG [president-general manager] of the Strasbourg company, explains: "Far from the prevailing state of overenthusiasm, we have tried to keep a cool head. Unlike some American companies, we didn't need to sell ourselves." The company's capital (81 million francs for the first 5 years of operation) has been provided by secure stockholders: Paribas, Assurances Generales de France, BSN-Gervais-Danone, Elf-Aquitaine and Moet-Hennessy. The company's scientific credibility is assured by world-renowned advisers: Mr Pierre Chambon and Mr Philippe Kourilsky, both university professors.

Transgene has thus developed an image of competence without exaggeration, highly appreciated by foreign customers. Europeans and Americans are in negotiations for contracts. The Japanese are visiting. Transgene is also different from other companies of the same type in that it remains a service company for the benefit of industrial businesses. "There is no question of becoming a manufacturer or distributor," Mr Eisenmann states. "We will go as far as the pilot-plant stage in close cooperation with our customer. Beyond that, it is up to him. That does not rule out, throughout a product's genesis, considering markets and competition in economic terms, like a manufacturer."

Transgene is obviously not yet earning any money. But within 5 to 10 years, it hopes to reach the threshold of profitability with revenues from marketed products produced by its laboratories.

Transgene wants to be a second-generation genetic engineering company. "Since we are not the first, we want to be different ...." With different resources as well: a team of about 50 persons and an annual operating budget of about 20 million francs--in no way comparable to the world leader in genetic engineering, the California company, Genentech: nearly 500 employees and, in 1981, an annual budget of $20 million. Still first on the hit parade of world bio-industry, Genentech has also just increased its capital with a 6.5-percent interest acquired by the giants of Swedish industry, including Alfa-Laval and Volvo. It is rumored that this Scandinavian initiative short-circuited Rhone-Poulenc, whose new president, Mr Loik Le Floch-Prigent, is very interested in biotechnologies. The appointment of Mr Gustave Strain, former general manager of Elf-Bio-industries, to the research department of the leading French chemical group, in order to breathe new life into the group's research, tends to confirm this. It must be acknowledged that its subsidiary, Genetica, specializing in genetic engineering research, has not been especially dynamic as yet.

According to a recent American study, 90 percent of the companies recently established in the genetic engineering field may well fail. Of the 200 companies registered in the United States, quite a few have already folded. Despite initial disappointments, the modest French initiatives will perhaps weather the storm.

11915
CSO: 3698/103

BIOTECHNOLOGIES PROGRAM AIMS AT 10 PERCENT OF WORLD MARKET

Paris CHIMIE ACTUALITES in French 3 Sep 82 p 6

[Text] The biotechnologies mobilization program--disclosed last July by Pres. Douzou, head of the "biotechnologies" mission, previously at the MRT and now at the Ministry of Research and Industry--is a public effort accounting for more than 1,100 million francs in 1982, including incentive credits of various natures and the internal expenditures of public research laboratories and organizations. This amount should be increased to 1,400 million francs in 1983 and, especially, Minister Chevenement insisted, "thanks to the steering structure established and to the actions taken, the purpose is to draw the most benefit from the efforts undertaken."

According to its promoters, the program calls for a "dynamic industrial strategy" capable of providing long term assurances to French enterprises for 10 percent of the world biotechnologies market, as opposed to an estimated 7.5 percent today.

Some 15 "notable" industrial projects--involving either PMI's, [small and medium size industries] or large national or private groups--have now been identified (see table) and are being examined by the administration. Overall, they represent an investment of more than 1 billion francs.

According to this mobilization program, businesses and government agencies are called upon to collaborate within the framework of public interest groups (P.I.G.) or scientific interest groups (S.I.G).

Three branches of development (Rhone-Poulenc, Elf-Aquitaine, Roussel-Uclaf) for industrial research:

	Medicine (Including antibiotics, immunology derivatives, hormones)	Reactants (Including monoclonal antibodies & enzymatic reactants)	Agricultural & food products (Including seeds, food for man & animals, & bio-pesticides)	Chemical feedstocks, energy compounds	Biodegraders & antipollutants
Genetic eng. Microbiology	Transgene Genetica (RP) Roussel-Uclaf Pharmuka	Intergene	Agrigene (Transgene) Roussel-Uclaf SNEA BSN		
Cellular fusion	Rhone-Poulenc	Immunotech Hybridolab (Pasteur) Clonetech	Clause SNEA Limagrain		
Enzymes Enzymatic eng.	Rhone-Poulenc	Biotechnika Biosys	Roquette		
Fermentation	Roussel-Uclaf Rhone-Poulenc		Lafarge-Coppee Bel, Bongrain, Sodima		
Cell cultures	Sanofi Merieux, Synthelabo		Rhone-Poulenc Protex, Pernod-Ricard Air Liquide	E.M.C. Rhone-Poulenc	
Instrumentation Process eng. Extraction Purification	Rhone-Poulenc Biolafitte	Biosys	Bio Lafitte, Nordon Setric Technip (I.F.P.) Speichim BSN		Degremont Lyonnaise des Eaux C Generale des Eaux
Selections Strains Data banks	Pasteur Institute		Museum		

Companies whose names are underlined have submitted dossiers for investigation by the Ministry of Research and Industry.

CHEMICALS

BREAKING UP OF PECHINEY UGINE KUHLMAN UNDERWAY

Paris SEMAINE DE L'ENERGIE in French 16 Nov 82 p 7

[Article: "Breaking Up of PCUK"]

[Text] When restructuring takes place, it is very rare that someone doesn't have to pay the price and, in the case of French chemistry, it is the chemical subsidiary of the Pechiney group [Ugine-Kuhlmann Chemicals) that is going to find itself cut up. The plan for the redistribution of PCUK resources agreed upon by the Ministry of Industry and the nationalized firms involved results in a distribution of activities among four firms:

--Elf-Aquitaine gets the lion's share by taking the chlorine division (MVC, PVC) including halogen derivatives and the fluorine chemistry that it had asked for, 11 plants in all, plus several additional subsidiaries and foreign subsidiaries, as well as all of PCUK's research and development activities.

--Rhone-Poulenc gets mineral chemistry, the agrochemical activities and pharmaceuticals, thereby strengthening its position as number one in the French pharmaceutical sector.

--CDF [French Coal Company] Chemistry is taking over organic chemistry and plastics (five plants) and is receiving a valuable component in the very prosperous subsidiary Lorilleux-Lefranc, the fifth ranked world producer of printing inks.

--Finally, EMC (Mining and Chemical Firm) gets the Loos platform (chlorine and potassium).

Now the problem of financing raised by buying these activities remains to be solved--and also for Elf-Aquitaine, the Total share in ATO [Aquitaine Total Organico] and Chloe--and the consequences the restructuring will have on employment, about which the administration reportedly has made very strict recommendations to the firms involved, also must be dealt with.

On the other hand, the Pechiney-Ugine-Kuhlmann group has just announced that it had committed an additional Fr 400 million for 1982, an effort that was made possible by the increase in capital contributed by the government (Fr 2.4 billion of which 2 billion are to clear up the financial situation

of the group). The deficit will be large again this year (more than Fr 2 billion).

With the exclusion of chemistry and steel, the activities of the PUK group will henceforth be divided among the ferrometallurgy aluminum and carbon products industries (65 percent), new activities (including nuclear) (15 percent) and refractory alloys, carbon fibers and transformation activities.

9969
CSO: 3698/115

INTEL, PHILIPS-SIGNETICS TECHNOLOGY EXCHANGE AGREEMENT

Paris ELECTRONIQUE ACTUALITES in French 29 Oct 82 pp 1, 14

[Text] Philips-Signetics and Intel have signed a seven-year agreement to exchange technologies and products relative to the MCS-48 and MCS-51 families of 8-bit microcontrollers (HMOS as well as CHMOS) and to the series IIC (InterIntegrated Circuits) and DDB (Digital Data Bus) communications network architectures developed by Signetics latter. The first D2B interface circuit should be sampled by the early next year.

According to the terms of the agreement, the two companies will jointly develop 8-bit microcontrollers which will be derivatives of the 8048 and 8051 integrating IIC and DDB interfaces. The microcontrollers will be manufactured by each of the two companies.

Signetics which has been a second source of the MCS-48 HMOS family since 1977, will receive from Intel the masks needed for the manufacture of the CHMOS 80C48, 80C49, 80C50 and 80C51, as well as the CHMOS 8051. In return, Signetics will provide Intel with the necessary technology for the layout of the two optimized series buses for consumer and industrial applications. The IIC bus is intended to provide the link between integrated circuits and/or modules built into electronic products for public consumption (maximum length 4 m, minimum transfer speed 110 bytes/sec by software layout, 7,500 bytes/sec by hardware). The DDB is designed to connect various pieces of equipment such as electronic home appliances, office networks and electronics automotive wiring (maximum length 150 m, minimum transfer speed 110 bytes/sec--software layout, 584 bytes/sec--hardware). Also, CENELEC is studying the possibility of adopting the DDB bus as an European standard of interconnection between electronic appliances in the home of tomorrow.

The first derived products, made by Signetics, will be the CHMOS 84C20 and the 84C40 with integrated IIC interface and the architecture of the 80C48 (they are based on the Philips 8400 family). The 84C20 will be sampled during the fourth quarter of 1983. Intel will be the second source for this line. Also Philips plans to sample the 8051, 80C48, 80C48 and 80C50 in 1983. The 80C51 will be sampled early in 1984. Derivatives of these various circuits with IIC and DDB interfaces will also be introduced in early 1984.

12215
CSO: 3698/83

SEMICUSTOM, CUSTOM IC DEVELOPMENT IN GREAT BRITAIN

Heidelberg ELEKTRONIK INDUSTRIE in German 6 Oct 82 pp 43-46

[Article by Bradley Turmaine: "Great Britain Develops Semicustom and Custom ICs"]

[Text] Custom and semicustom ICs are becoming ever stronger competition for standard logic ICs and show rapid growth in many areas, resulting in a reduction in the demand for SSI/MSI logic. In the course of this development, Uncommitted Logic Arrays (ULAs), which account for the strongest expansion in electronics--more than 70 percent annually--, have become the center of attraction. In more than half of their applications, for instance, these ICs replace 30 or more standard ICs, as arranged around microprocessors. Considerable developments in hybrid technology supplement the progress made in monolithic integration, in that semicustom ICs are designed with the use of hybrid technology.

The ULA Circuits

The advantages of the ULAs render these ICs not only suitable as a replacement for standard logic ICs, but also make new applications feasible in areas where a microprocessor or standard logic are not suitable because of space requirements or costs involved, or when computer capability is not required.

The current market for ULAs will most likely multiply tenfold by 1985; if this trend continues, every third IC sold by the end of this decade will be a semicustom array. This rapidly growing demand offers unique opportunities for Europe to partially balance the enormous trade deficit with regard to ICs, of which huge quantities are imported from the United States and Japan.

Both U.S. and Japanese manufacturers have concentrated their expertise on domestic semiconductor markets and on satisfying their needs. Only recently have they begun to offer semicustom ICs in Europe as well. As long as they do not establish fixed centers of development in Europe, these companies will be at a disadvantage because of their geographic location and the distance involved. In contrast to standard ICs, which can be ordered by catalog, semicustom ICs require a close cooperation between seller and user. Therefore, the capability of offering such cooperation is an important factor in successfully developing semicustom ICs.

The fact that in Great Britain the ratio of semicustom ICs and standard ICs is higher than anywhere else in the world, including the United States and Japan, can be attributed, in part, to Messrs. Ferranti, a British company which was a pioneer in the development of ULAs. Meanwhile, the latter has more than 10 years of experience in the development of ULAs and was practically without competition on the market until 2 or 3 years ago the fast growing semicustom IC market was discovered by a number of companies quickly pushing their number up to more than 30 today.

With more than 1,000 developments, Ferranti has meanwhile gained more experience in this field than any other company. Following the initial application of a ULA IC in a German Rollei camera as early as 1972, practically all European camera manufacturers now utilize Ferranti ULAs at least in some of their products, according to the company. In spite of the rapid expansion of their ULA activities, the company saw an inevitable reduction in its market share, as the competition became more and more numerous; with a market share of 30 percent of the total market, though, it will be able to retain its worldwide leadership position this year, according to Ferranti. Although this leadership position can be partly attributed to experience in the subject matter, the sizes and types of their comprehensive product line are decisive factors as well (see table 1).

The profitability of a ULA development is dependent upon the required silicon surface and thus upon the size of the array. Most efficient use is made when the IC logic utilizes a maximum portion of the respective array, as unused gates cost money. It is therefore important to select the optimum size for a certain use from numerous array sizes.

A number of the Ferranti gate arrays listed in table 1 are also capable of performing analog functions. Although CMOS ICs are available now, which also feature this capability to a limited degree, this mixture was one of the main advantages of bipolar technologies, e.g., the CDI (Collector Diffusion Isolated) process. In these arrays the area around the center digital part serves to generate analog functions, which are frequently required to produce a link between digital electronics and the periphery. The ULA 1 G and ULA 2 G models contain two transistors of a maximum load of 100 mA as well as 35-pF capacitors in order to form operational amplifiers on the chip. The very low operational speed of the gate of this array may be improved by connecting the power sources in parallel. By using a double power supply (two separate power supplies connected in parallel), the gate operational time can be reduced by half, with a maximum permissible frequency of 500 kHz. By means of a triple power source the operational time of the gate is reduced to one third, etc. The very low power input in comparison to CMOS ICs render this type of array suitable for battery operation. One feature of the bipolar array is that one can select between short operational time of the gate and low power input, which is characteristic of all Ferranti gate arrays. Engine governors and camera controls are typical applications of the 1 G and 2 G types.

The 1L, 2L and 5L RTL arrays are from a more established Ferranti product line; they were retained for their analog capabilities and can be designed for analog functions exclusively, if required.

The 2N and 2C ULA types are the workhorses when replacing standard ICs by TTL or CMOS ICs. If these types do not suffice, the 5N and 5C types are applicable. The 9C type manufactured in a 3 um structure is designed for yet larger logic implementations.

The R series introduced last year features increased performance as a result of the use of six masks instead of five in the CDI process, as well as a refined design and cell geometry. The B and C types of the R series may be regarded as improved versions of the arrays discussed above. The RA types are ICs that operate at high speeds (almost to ECL specifications) and are suitable for computer applications, especially the larger sizes, e.g., for connecting microprocessors to local systems. The larger B and C types are extensively used in telephone equipment if speed is not a major criterion.

Layout with CADs

While the older types of arrays are designed for manual layout, the R series is available in two designs: one for manual layout, and the other for automatic layout with the support of the modern CAD systems by Ferranti. The difference is in the fine width of connections between the individual gates of the array. The automatic wiring requires more space so that the connecting paths are wider, adding to the array's overall size. Although normally the price of an automatically wired array is higher due to the larger silicon area required, automatic wiring permits very fast production of customized ICs, in most cases within a few weeks.

In general, manual procedures allow a higher packing density than automatic routing. A gate utilization factor in excess of 95 percent is feasible, and according to statements by Ferranti, the utilization factor of the silicon chip which can be achieved makes the use of fully customized ICs redundant, even when huge quantities (of over 100,000) are involved.

Examples of Application

The ZX81 Sinclair Personal Computer is an example for the replacement of standard logic ICs by ULAs with very large quantities. It predecessor, the ZX80, contained 22 discrete ICs. For the current model the number was reduced to four, including one Ferranti ULA. Currently, more than 50,000 ZX81s are manufactured monthly.

Although Ferranti sees its task mainly in selling high-quality ICs, it has recognized the necessity of a close cooperation with the user, which plays such an important role for semicustom IC development; it has therefore established development centers in Munich and New York.

As a unique solution of the problems of customers who do not have direct access to these development centers, Ferranti offers the ULA Designer, an intelligent, decentralized development system with interactive graphic functions. It permits the layout of ULAs by the customer's development engineers. During some development stages, e.g., the automatic routing, which requires comprehensive computer operations, the system is connected to

the Ferranti main computer via a telephone line. The system comprising a multiuser minicomputer, a graphics screen and a keyboard pays for itself within a few development processes. Since its introduction, ten such systems have been sold, mainly in Europe. The system may be seen at the electronica fair.

ECL and CMOS Arrays

Other British firms are Ferranti's major competitors in the area of ULAs. In the coarse of the increase in the demand for arrays in CMOS technology, Marconi and Plessey have been manufacturing an array under a license agreement with another British firm, Micro Circuit Engineering; these companies thus function as each other's secondary suppliers.

These arrays are designed for automatic layout; they can, however, be simply wired manually, except for the 2,000-gate version. According to statements made by Micro Circuit Engineering, one person can fully design and manually test a 1,400-gate array within 2 weeks by means of their masterplan process with a gate utilization factor of better than 85%.

The Cell Arrays

Plessey and MEDL concentrate their activities on automation, and the arrays are only part of much more comprehensive services in the semicustom market. Both companies also offer a cell array development service.

Cell arrays bridge the gap between ULAs and fully customized ICs. As custom arrays, they require a full set of masks, which, however, are called from a computer library in the form of logic elements according to certain rules and are applied onto silicon. This procedure then is much faster than a fully customized IC development. The considerable savings provided by this procedure are a result of the fact that little silicon area is required.

The design comprises the selection of the logic elements required (from inverter to JK flipflops) and their automatic arrangement on the chip. Then the cells are interconnected by means of an automatic routing program. This process can be extended to the design of an entire printed circuit on silicon.

Marconi and Plessey offer the gate and cell arrays alternatively in order to maximize the advantage of semicustom ICs. For quantities of several thousand to several tens of thousands ICs annually, gate arrays can be the most inexpensive solution. For quantities of over 15,000 or more, the savings in the surface of cell arrays, which require no more than 60% of the silocon surface required by a ULA for the same logic, compensate for the additional costs incurred initially.

If initially only moderate quantities are required, yet a rapid growth of production is scheduled, the decision in favor of cell arrays must not be made immediately. An IC originally designed as ULA can be easily converted to a cell array upon production startup. The costs of this conversion can most likely be balanced within the course of a few months of production.

Another company established in the field of semicustom ICs is Racal Microelectronic Systems specializing in turnkey microcomputer systems. The company develops and manufactures a large number of customized electronic circuits, including gate arrays, cell arrays, and custom ICs. Their gate arrays are listed in table 1.

Great Britain has been making considerable longrange efforts to retain its leadership position in the area of semicustom ICs. Marconi and Plessey, a number of research institutions and major users, e.g., British Telcom, have formed a joint venture by the name of UK5000 in order to improve the automatic software and to prepare the manufacture of high-performance arrays featuring 5,000 gates or more by the end of this year.

A detailed 170-page report on semicustom ICs entitled THE SEMI-CUSTOM REVOLUTION AND YOUR BUSINESS was recently published by BPA (Technology and Management) Ltd. It addresses technical managers in electronics and related fields and discusses the opportunities afforded by semicustom developments as well as the disadvantages connected with ignoring this technology. The report contains a thorough analysis of technologies and their impact on the electrnoics industry both in the technical and the commercial field. The report also discusses the opportunities and problems connected with semicustom developments, the probable growth rates and their impact; it may be obtained from the BPA booth at the electronica fair.

Hybrid ICs

Although one might assume that the hybrid business would be severely and adversely affected in the semicustom area, all indications show that this industry is adjusting to the situation by offering more supplementary and comparative services.

Currently the markets for thick- and thin-layer ICs are comparable in strength. It is possible, however, that due to the increasing advantages of the thick-layer technology, this technology will next year become the more popular and leading technology.

Generally, Great Britain accepted the thick-layer technology only hesitantly, as compared to other European countries. However, this permitted larger investments into the process and resulted in high performance in this field.

Plessey, Marconi, Racal and Ferranti offer comprehensive hybrid development services. Of these firms, Ferranti specializes mainly in thin-layer ICs for the military, being a major supplier to the military sector.

Marconi has more than 15 years of experience in hybrid development and manufactures a variety of hybrids for defense purposes and professional applications. The company offers a free consulting service for the development and design of special thick-layer ICs in large and small quantities. By acquiring Circuit Technology, New York, one of the largest manufacturers of thick-layer ICs in the United States, Marconi has extended its capabilities for these ICs.

The said large companies represent only part of the British supply capabilities in the hybrid sector. A number of independent hybrid suppliers, e.g., Newsmarket Microsystems, a company of the Cambridge Electronics Industries Group, provide the industry with valuable consulting and development services.

Newsmarket, a company founded 25 years ago, initially became a leading British manufacturer of germanium semiconductors; in 1965, however, they changed to thick-layer technology. Following a rapid expansion in the course of recent years, the company is in the position to develop and manufacture all types of hybrid ICs, starting from sophisticated designs in chip-and-bond technology to the simpler butt-welded types. The quality assurance standards are according to BS9450 and DEF-STAN 05-21 specifications.

Newmarket recently announced a development service for high-precesion active filters for the 10 Hz to 200 kHz frequency range. One possible application of these thick-layer hybrid ICs are anti-aliasing filters in measuring devices. The electronic development is done at NKT according to precise technical specifications. The developments profit from the significant advantages of hybrid manufacture, e.g., high stability, low dissipation, and excellent reproducibility. Normally, the time between receipt of the filter specifications and completion of the specimen is between 12 and 16 weeks. Welwyn Electronics, known for precision layer resistors and flexible multilayer plates, is also very active in the areas of thick-layer and thin-layer hybrids. The Welwyn Microelectronic Division has made large investments in computer-controlled lasers for precise balancing and in automatic test equipment. A major portion of the production is earmarked for military and telecommunications uses, for instance a new generation of electronic telephone switching installations.

One of the advantages of Welwyn is the experience in related fields. The company, for instance, manufactures all chip capacitors and resistors used in hybrid ICs, thus permitting accurate control of the entire production process.

In automation technology Corintech, another manufacturer of thick-layer hybrid ICs, is the major competitor. The printing and drying of substrates, laser trimming (active and passive), positioning of up to 25,000 components per hour, bonding by gold wire and testing of hybrids are all automatic functions. Although the automatic equipment is designed for medium to large quantities, Conrintech also supplies prototypes and smaller production quantities by using manually operated machines.

Norsem Electronics is developing and manufacturing a number of hybrid modules featuring liquid crystal displays. One of these modules, NDM 3D5, is a complete 3-1/2 digit DVM on a 5 by 5 cm^2 substrate. Further, the company manufactures custom ICs by means of this process, for which a patent application has been filed.

Summary

Due to Ferranti's activities, the British electronics industry is a worldwide leader in the development and use of logic arrays. Ferranti's main competitors are British companies, which have recognized the advantages and opportunities afforded by semicustom ICs.

This strong position provides the opportunity to relocate the--at least part of the--development and manufacture of ICs used in Europe to where they belong--Europe. In doing so, Great Britain can assume a leadership role.

(1)

Tabelle 1: Die Gate Arrays britischer Hersteller

(2) Hersteller Kennziffer für Anfragen über Leserdienst	(3) Typ	(4) Technologie	(5) Zahl der Gatter	(6) Lineare Funktionen	(7) Max. Taktrate (MHz)	(8) Gatterlaufzeit (ns)	(9) Leistung je Gatter (mW)	(10) Kompatibilität
Ferranti **717**	ULA 1G	CDI	100	ja	0,2	500	0,002	TTL
	ULA 1L	RTL	150	ja	0,25	200	0,18	CMOS
	ULA 2G	CDI	160	ja	0,2	500	0,002	
	ULA 1U	CDI	280	ja	0,3	450	0,003	
	ULA 2L	RTL	340	ja	0,25	200	0,2	
	ULA 2N	CDI	450	nein	6	25	0,07	
	ULA 2C	CDI	450	nein	20	8	0,25	
	ULA 2M	CDI	500	ja	0,1	2000	0,0004	
	ULA 5RC	CDI/FAB-2	500	nein	10	15	0,03	
	ULA 5RB	CDI/FAB-2	500	nein	20	7,5	0,1	
	ULA 5RA	CDI/FAB-2	500	nein	60	2,5	0,3	
	ULA 2U	CDI	510	ja	0,8	450	0,003	
	ULA 3U	CDI	580	ja	0,8	450	0,003	
	ULA 5L	RTL	730	ja	0,25	250	0,2	
	ULA 5N	CDI	900	nein	6	25	0,07	
	ULA 5C	CDI	900	nein	20	8	0,25	
	ULA 9RC	CDI/FAB-2	900	nein	10	15	0,03	
	ULA 9RB	CDI/FAB-2	900	nein	20	7,5	0,1	
	ULA 9RA	CDI/FAB-2	900	nein	60	2,5	0,3	
	ULA 12RC	CDI/FAB-2	1200	nein	10	15	0,03	
	ULA 12RB	CDI/FAB-2	1200	nein	20	7,5	0,1	
	ULA 12RA	CDI/FAB-2	1200	nein	60	2,5	0,3	
	ULA 16RC	CDI/FAB-2	1600	nein	10	15	0,03	
	ULA 16RB	CDI/FAB-2	1600	nein	20	7,5	0,1	
	ULA 16RA	CDI/FAB-2	1600	nein	60	2,5	0,3	
	ULA 18RC	CDI/FAB-2	1800	nein	10	15	0,03	
	ULA 18RB	CDI/FAB-2	1800	nein	20	7,5	0,1	
	ULA 18RA	CDI/FAB-2	1800	nein	60	2,5	0,3	
	ULA 9C	CDI	2000	nein				
	ULA 20RC	CDI/FAB-2	2000	nein	10	15	0,03	
	ULA 20RB	CDI/FAB-2	2000	nein	20	7,5	0,1	
	ULA 20RA	CDI/FAB-2	2000	nein	60	2,5	0,3	
Ferranti **717**	ULA 24RC	CDI/FAB-2	2400	nein	10	15	0,03	
	ULA 24RB	CDI/FAB-2	2400	nein	20	7,5	0,1	
	ULA 24RA	CDI/FAB-2	2400	nein	60	2,5	0,3	
	ULA 40RA	CDI/FAB-2	4000	nein	60	2,5	0,3	
	ULA 100RA	CI/FAB-2	10000	nein	60	2,5	0,3	
Marconi Electronic Devices **718**	MT 7300	s.g. CMOS	336	nein	10	6	low	TTL CMOS
Micro Circuit Enginering **719**	MA 8505	s.g. CMOS	560	nein	10	6	low	TTL CMOS
	MT 75000	s.g. CMOS						
	CLA 10XX	s.g. CMOS						
Plessey **720**	MA 8510	s.g. CMOS	960	nein	10	6	low	TTL CMOS
	MT 72000	s.g. CMOS						
	CLA 12XX	s.g. CMOS						
	MA 8515	s.g. CMOS	1440	nein	10	6	low	TTL CMOS
	MT 71000	s.g. CMOS						
	CLA 15XX	s.g. CMOS						
	MA 8520	s.g. CMOS	2014	nein	10	6	low	TTL CMOS
	MT 60000	s.g. CMOS						
	CLA 18XX	s.g. CMOS						
Plessey **721**	SCD 1XXX	ECL	75	nein	300	0,55	10	ECL 10k
	SCD 2XXXH	ECL	300	nein	300	0,55	10	ECL 10k
	SCD 2XXXM	ECL	300	nein	250	1,5	3	ECL 10k
	SCD 2XXXL	ECL	300	nein	100	2	2,5	ECL 10k
Racal Microelectronic Systems **722**	ULA 448	s.g. CMOS	448	nein	8	10	low	TTL CMOS
	ULA 880	s.g. CMOS	880	nein	8	10	low	
	ULA 1550	s.g. CMOS	1568	nein	8	10	low	

Key:

1. Table 1: Gate Arrays of British Manufacturers
2. Manufacturer
   Code for inquiries to the Editor
3. Type
4. Technology
5. Number of gates
6. Linear functions
7. Maximum pulse rate (MHz)
8. Gate operational time (ns)
9. Gate output (mW)
10. Compatibility

STRENGTHS OF BRITISH ELECTRONICS INDUSTRY ASSESSED

Heidelberg ELEKTRONIK INDUSTRIE in German 6 Oct 82 pp 38-40

[Article by Ron Neale, Editor for Electronic Engineering]

[Text] This paper is intended to provide a survey concerning the most powerful areas of the British electronics industry. The survey is based on a questionnaire. Examples of innovations in these areas indicate that British industry occupies a leading role in several areas and will also retain this role in the future.

The first difficulty in an attempt to gain an unbiased overview consists in the selection of persons to be interrogated and in the mode of presenting the information which they provide. An important problem for the analyst is that industry is not a continuum in a mathematical sense, which may cause any attempt at a graphic display to founder.

A second and not less formidable difficulty for an attempt to obtain a national overview concerning the electronics industry is that electronics is an international affair.

The role of multinational businesses frequently covers over the national efforts. One rapidly reaches the conclusion that success on a national basis actually rests on the capability of drawing the best from the international electronics industry and making it one's own; in this respect, Great Britain has a brilliant previous history. One important contribution to this was made by the circumstance of having a common language with the United States, a source of numerous electronic innovations in recent decades.

The Investigation

If one does not let oneself be held back by the mathematical difficulties or by the problems associated with the internationality of the electronics industry, one can yet attain a meaningful overview of the electronics industry in Great Britain.

The technique used for this was simple: Assemblage of a group of persons, and interrogation of these persons concerning the areas where they saw the strengths of the British electronics industry. The subjects were electronics engineers and journalists active in the electronics industry. The assemblage of the interrogated

subjects was simple, but not the selection and formulation of questions posed to them. Another difficulty was a simple presentation of the results.

Within this branch, there exists a well-known continuum, namely the flow of ideas through the stages of research-development and design-production-test-application. These stages were used as an axis for a plot of the national electronics industry.

Another dimension, preferably another continuum, was required for the investigation. If one subdivides the electronics industry into the major categories of components, hardware, systems, and instruments, these categories can form a basis for a juxtaposition with the above-mentioned criteria. Although other subdivisions would have been possible, the present investigation is limited to these four essential categories. In many years of the transmission of information for publication, these categories have been established as natural divisions for the branches. The component area comprises passive, active, and integrated circuits. Plugs, receptacles, housings, wires, etc. comprise the hardware. Systems are all combinations of electronic devices including software. Instruments are electronic devices, including test units, which have been developed especially for measurement purposes.

With these categories as one axis and the stages of the flow of ideas as the other one, one can draw a contour map, which exhibits the areas of relative strength and which provides information concerning the character of the electronics industry of a country.

It was now a simple task to request the selected group of persons to grade the industry in every square of such a map. The interrogated subjects did not know how the information would be further used. Their task was to assign grades on a relative scale of 1 to 4. The results were subjected to a splitting process, and are shown in Figure 1 in the form of a contour map.

For the potential customer of Great Britain's electronics industry, the general conclusion appears that there is activity in all areas of the branch, that the main strengths lie in the systems area, and that the capabilities in hardware and measurement instruments are a significant and natural effect of this activity.

A few examples of the most recent innovations of the electronics industry in Great Britain will be mentioned below. These examples contribute towards preserving in the future the strength of the British electronics industry - for the client, for the country, and for Europe.

Innovators and Innovations

Ferranti Company has a long-standing tradition of innovations which extend to nearly all aspects of the electronics industry. The production pallette extends from semiconductors to housings, from power transistors to hybrid circuits, with applications in data transmission, communications technology, defense, and nearly every other area in which electronics are used. A few of the numerous products that have emerged from this long innovative tradition will be exhibited at the Electronica 82, where Ferranti will be represented with the industrial components group, the microelectronics group, the professional components department, the Ferranti Electronics Ltd., and the Ferranti Computer Systems Ltd. (Bracknell Division). For reasons of space, only a few of the inventions can be discussed at this point.

Ferranti is considered the inventor of the ULA circuit (uncommitted logic array) which immediately aroused the interest of users, manufacturers, and the media. The ULA offers the developer the considerable commercial advantages of implementing new designs in the form of monolithic silicon chips without the cost burden which a completely custom-specific development or an investment in semiconductor production systems would entail.

Ferranti, however, did not invent the ULA circuit to relinquish its utilization to others. On the contrary, Ferrari is constantly presenting leading products in this area, without any sign of diminution of this activity.

The present ULA offer comprises 30 types with up to 4000 gates, all of which are being mass produced. A few ULAs were especially developed in view of a complete system integration - i.e. for combining powerful analog and highly complex digital functions on one and the same chip.

At this time, Ferranti is making cautious statements about arrays whose complexity exceeds what has been said above by a factor of 10. Ferranti indicates the possibility of being able to process and produce, by 1985, an array with 120,000 gates. Application areas are automotive, communications, computers, household appliances, electrical tools, photography, telecommunications, air traffic, measurement technology, military systems, personal computers, sales automation, and toys.

Successes in the area of ULA components or gate arrays are not based only on the silicon chip itself, however, but on assuring the most uncomplicated possible, smooth, and effective contact between client and manufacturer.

For this reason, Ferranti has presented the ULA designer; this powerful, user-compatible and economical interactive development system offers the client all CAD (computer assisted design) capabilities for the specification, development, and testing of ULA circuits. The ULA designer is installed at the client and is connected, through a telephone line in standard speech quality, to the ULA Horst computer and Ferranti in one of the CAD complexes in the English Manchester or in Scotts Valley, California. It offers the customer complete capability of controlling his ULA design up to production maturity, without special knowledge in the handling of computers or in semiconductor technology being presupposed for this.

In the area of electronic systems, Ferranti has developed two novel packing techniques with the designations HELP and DEPTH. Hybrid circuits are used with the HELP technology whereby printed circuits can be completely replaced in conventional systems such as e.g. on-board radar units.

DEPTH (Downhole Electronic Packaging Through Hybrids) is an electronic housing system for use in deep drillings such as e.g. oil drillings, where the diameter of the complete housing is subject to restrictions. The system fits into a pressure-proof housing with 6 cm inside diameter, is extremely robust, and can be used at temperatures up to 125° C.

Ferranti has proven its innovative strength in the military area also; an example for this is the new military Argus computer M700/40. Instead of the two Europa cards of the precursor system M700/20, it consists only of a single hybrid component (Figure 4).

As Figure 1 shows, Great Britain's strength lies in the construction of electronic systems. Corresponding strengths must then also exist in all areas of testing, which are associated with spcific innovations. An example from this area is the founding of MTL, a completely independent enterprise with headquarters in Alton, Hampshire, which concerns itself with merchandise receiving tests on finished semiconductor components.

In fact, in modern electronics, independent burn-in tests and classifications on encapsulated semiconductors have become a precondition for the quality and reliability of the final product in which these components are used. As the individual semiconductor components have become more complex, the testing effort also increases, so that test methods and test equipment become an unintended and expensive affair for the user.

MTL merely took the novel step of offering merchandise receiving tests as a service. A simple concept, but the time was right for it. As proof of the existing demand, one can cite the fact that, within a few years, MTL has become a rapidly growing business with annual sales of three million pounds. The business can say that, as a result of its activity, it has gained more independent experience concerning the requirement and quality of products of semiconductor manufacturers all over the world than is available anywhere else in the world. This latter circumstance, as well as customer support, contributes to the general strength of the British electronics industry and its products. MTL Company has the approval according to BS 9000 and, in this respect, can act in the name of component manufacturers.

A proof for further innovations in the area of component and circuit testing are the test systems of Deltest Company, with headquarters in Poole, Dorset. It covers the need for economical, powerful, semiconductor test systems, which fulfill the requirements of a very large number of different components.

The solution consists in a powerful basic unit, designed as a desk top unit, which comprises a controller and special measuring devices. A series of plug-in modules makes possible the creation of test conditions that are required for every component type. It takes only a few seconds to assemble the system for testing a particular circuit. This property, in combination with a menu-controlled programming, makes it possible to perform production tests quickly and productively.

Without having to change the system, a test engineer can completely utilize all capabilities of the system and can either modify existing application programs for client-specific circuits or can write completely new test programs by means of the interpreting on-line software. The common starting point for all application programs, whether they come from Deltest or are generated by the user, is a core program which contains ready input and output sequences, which secure identical working procedures for all the generated test programs.

The test systems make it possible to test integrated circuits in analog, digital, and hybrid technology, as well as discrete components, by selecting the appropriate modules. A flexible universal module makes it possible to test special and client-specific circuits. Connections are here available for data recording units, analyzers, and autohandling units, as well as RS 232 and IEEE interfaces.

One module that is necessary in all electronic devices is the power supply. Using this as an example, the innovative role of Great Britain will again be demonstrated.

Coutant Company, with headquarters in Olfracombe, Devon, offers more innovation in its new ML power supplies, as regards function, design, and application of new technologies, than could have been suspected with so familiar a product as a power supply. The power supply is designed so that it fulfills as many as possible of the power supply requirements in industry, in the form of a single product series.

The key for fulfilling a large plurality of requirements as regards starting power and construction form is the modularity of the electrical and mechanical design. This is combined with the use of power FETs at 75 kHz, a use which is optimal according to the company's data, and with the reintroduction of the transductor amplifier as a control element that operates with the same high frequency.

Another design characteristic is the use of a single power transformer for isolation between the primary and secondary side, in place of the conventional transformer or optocoupler regulator loop. On the secondary side of the transformer one can connect, individually or in combination, regulated or semi-regulated switching regulators or longitudinally regulated output modules.

Especially remarkable in the design of this output module is the introduction of the transductor amplifier as a control element in the switching regulator module. Transductor amplifiers were previously already used for low-frequency power supply regulation, but there is essentially no evidence of their use at 75 kHz. A great advantage of the transductor amplifier is its high reliability by using simple components such as wire, coil material, and solder connections, in comparison to the active semiconductor circuits that are normally used.

These innovations in power supply technology are important just by themselves alone, but Coutant has gone one step further and is the first business in the world to use for the transductor amplifier, in commercial fashion, the new, powerful, amorphous magnetic materials. Coutant procures the materials for this from Vacuumschmelze in Hanau.

A World-Wide Novelty

According to our investigation, Great Britain's strength is only secondarily in the area of instruments. However, an important innovation can be pointed out there, which represents a world-wide novelty: Scopex, a British enterprise, has recently presented the first oscilloscope with a tubeless flat picture screen. This device, too, combines British innovation with development skills, by shifting further upwards the limits for the size of LCD flat image screens.

The oscilloscope that has been presented under the name Voyager uses, instead of the conventional electron beam tube, an LCD matrix with 128 x 256 image points on a useable surface of 6.4 x 10.2 cm^2 (electronik industrie, June 1982, page 6). More than 30,000 individual image points can be addressed, and they are activated by means of a patented system, which was invented by the scientist Dr. Ian Shanks of the Royal Signals and Radar Establishment in Malvern.

The LCD display itself represents important progress; besides the capability of a very complex display, the material also offers advantages. This involves a color-phase-transition material in place of the customarily used TN-cell. As a result, the display offers a very large viewing angle, good readability, and high contrast, under the most various conditions of illumination.

By using an LCD matrix as the display medium, with the advantages of a low voltage requirement and a minimal power consumption, Scopex could construct the Voyager model as a battery-operated instrument. Despite this conception as a portable device, operated from rechargeable storage batteries, it offers most of the standard performance characteristics of conventional digital memory oscilloscopes, which are fed from power supplies as well as capabilities for storing an input signal. With a digitalization rate of 1.25 MHz, combined with a signal reproduction fidelity (image sharpness) of eight points/cycle, it achieves a bandwidth corresponding to 150 kHz. Extensive pretrigger capabilities belong to the standard equipment. Here, either 1/4, 1/2 or 3/4 of the display area can be chosen for pretrigger information.

By means of the two-channel display, the oscilloscope is capable of displaying and storing a signal in one channel and of comparing it, in the other channel, with a signal acquired in real time.

Winslow International from Tunbridge Wells, Kent, was also successful in recognizing a market gap. It can now claim to be the largest specialized manufacturer of IC mountings outside the USA.

Expensive ICs require the use of mounts. The chips of the new generation - VLSIs, EPROMS, and magnetic bubble memories - are too valuable to be soldered directly into printed circuits. And to solder them into printed circuits is an increasing need. And as the need for IC mountings grows, so also grows Winslow International. In this year alone, production will be larger than the production of all other European manufacturers together. This represents a close challenge to American predominance in this branch. With the current growth of the market for IC mountings by 22 percent per year, one can start from the fact that, by 1986, 20 percent of all integrated circuits will be placed in mountings, and that the world-wide demand for mountings in this year will exceed 2500 billion units.

To be able to satisfy future demand, Winslow has installed special machines in the production installation in Wales. The new production lane can assemble 6000 mountings per minute and can pack them so that they all point in the same direction and can be used directly for automatic component-installation systems.

Furthermore, Winslow has introduced a series of zero plug-in force mountings for high stress, which are considered the first zero plug-in force mountings from European production.

Altogether, Winslow has brought out 10 complete new product families, and another 15 are to come on the market before this year is over. The business has now addressed itself to an intense materials testing and development program, whose first result is a new alloy with the designation Wincon 23. This alloy has outstanding properties as a contact material.

Summary

Only a few examples of the numerous innovations could be mentioned here, which make up the new character of the British electronics industry.

In Great Britain, a quiet revolution is taking place, which is reforming the British electronics industry in basic areas. Even if these innovations individually are not particularly striking and do not make headlines, taken together they solidify overall strength for the future, for the use of international clients of Great Britain.

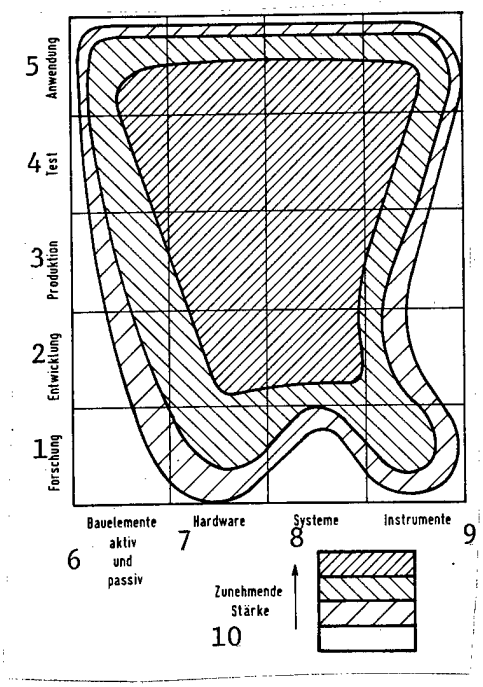


Figure 1. The performance capability of individual areas of Great Britain's electronics industry in a contour representation

1 research
2 development
3 production
4 test
5 application
6 components, active and passive
7 hardware
8 systems
9 instruments
10 increasing strength

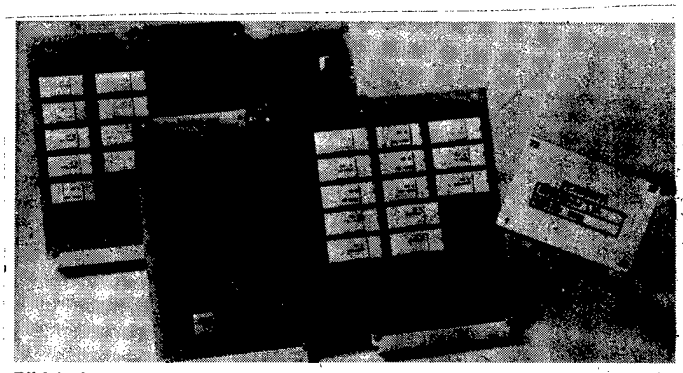


Bild 4: Der neue militärische VLSI-Mikroprozessor M700/40 von *Ferranti* (rechts) im Größenvergleich mit seinem Vorgängermodell M700/20 in Doppel-Europakarten-Format

Figure 4. The new military VLSI microprocessor M700/40 by Ferranti (right) in a size comparison with its precursor model M700/20 in double Europa card format.

8348
CSO: 3698/99

STEPS TO PRESERVE, ADVANCE FRENCH MICROLITHOGRAPHY TECHNOLOGY

Paris LE NOUVEL ECONOMISTE in French 1 Nov 82 p 57

[Article by Anne-Marie Rocco]

[Text] It was Prime Minister Pierre Mauroy himself who announced it in Nantes: MATRA [General Mechanics, Aviation and Locomotion Company], whose subsidiary, Euromask, has developed a machine for producing integrated circuits, will go into partnership with the American leader GCA to develop this new activity, created less than 2 years ago. MATRA, which began producing integrated circuits as part of the "components plan" established in 1977 (MATRA-Harris plant in Nantes), will therefore integrate its activities up the line.

It seemed that the Thomson group, another leader in developing integrated circuits, would follow the same route. Since 1979, its engineers have worked to develop an electronic mask and optical photorepeater, two pieces of equipment used in studying and producing integrated circuits. A dramatic development: 2 days before MATRA made its announcement, Thomson threw in the towel. A surprising decision for everyone.

When the "components plan" ended, it quickly became necessary to reorganize procedures up the line, since imports of machines to equip the plants largely eroded the plan's positive effects on the French trade balance. But 10 to 15 types of different machines are used in the production line for integrated circuits: It was impossible to plug all the gaps at once. Preference was given to microlithography, i.e., to the technique which makes it possible to draw the circuit's "pattern" on the silicon-disk substrate. This stage of production actually accounts for 30 percent of the cost of integrated circuits. And the world market is still growing: $500 million in 1980, $2 billion in 1985, according to estimates of Cabinet Mackintosh.

MATRA is carrying out its projects in two stages. On one hand, a team of about 40 persons has been assembled to perfect this apparatus. A subsidiary, Euromask, has been created near Nantes, where MATRA's integrated-circuits plant is located. Government assistance is significant: a subsidy of 20 million francs for a total investment of 30 million. At the same time, since September 1980, MATRA is engaged in negotiations with the American company GCA, which shares, with its fellow American company, Perkin Elmer, 80 percent of the world market. The negotiations have just ended. A joint MATRA-GCA

subsidiary will be established; it will produce photorepeaters, which it will sell itself in Europe and which will be marketed, in the United States and worldwide, by GCA. This subsidiary will also market the machines produced in the United States by GCA in Europe. Between now and 1987, the investment will be between 350 and 500 million francs; 170 jobs will be created in 1 year and about 1,000 between now and the end of the plan.

At Thomson, they waited longer. A team of about 50 persons was assembled and assigned in 1979 to Cameca, one of the group's subsidiaries. According to personnel, 200 million francs were invested by Thomson to develop and produce the first apparatus. Several hundred million more francs would have been required to convert to the industrial stage. Thomson decided not to take that step. The conclusion of the MATRA-GCA agreement was apparently the determining factor in making that decision. Supported by GCA's very efficient commercial network, MATRA's subsidiary would not permit another French competitor to engage in this activity profitably. But the minister of industry does not agree: He has just given Mr Gomez, Thomson's P-DG [president-general manager], a month to reach an agreement with MATRA.

11915
CSO: 3698/103

THOMSON-EFCIS, AMCC DEVELOPMENT, COMMERCIALIZATION ACCORD

Paris ELECTRONIQUE INDUSTRIELLE in French 15 Sep 82 pp 17, 18

[Article by C.P.: "Thomson-EFCIS-AMCC Accord"]

[Text] Thomson-EFCIS [Research and Manufacture of Special Integrated Circuits] and AMCC--Applied Micro Circuits--have just signed an accord according to the terms of which Thomson-EFCIS will develop, industrialize and market high performance bipolar predisseminated integrated circuits of the Q 700 series. This accord provides that Thomson-EFCIS will have the possibility of offering these circuits worldwide.

The two firms also expect to cooperate in the further development of this family. Circuits of the Q 700 series are high-performance bipolar predisseminated networks. They use TTL [Transistor Transistor Logic] or ECL [Emitter Coupled Logic] clocks that can operate at speeds in excess of 80 MHz, in the military temperature range. Thomson-EFCIS will have a complete design and production capacity for these circuits after the fourth quarter of 1982 and will also supply AMCC with plates for the needs of the American company.

The selection of AMCC by Thomson-EFCIS is essentially due to the remarkable performance of the circuits of this family, qualified in the military temperature range, as well as to the software for the placement of routing and related verification that makes it possible to assure very short delays in product availability, which is the major advantage of prediffused networks.

9969
CSO: 3698/115

BRIEFS

ICL EXPECTS PROFITABLE YEAR--For the current 1981/1982 fiscal year the ICL management expects profits again. Following last year's losses of approximately 50 million pounds, a full consolidation of the largest European computer manufacturer is now becoming apparent. The semiannual report submitted just recently shows a significant improvement of the profit situation. According to this report, the 1981/1982 fiscal year ends with a loss of 13.3 million pounds (33.9 million pounds last year). In the past months, the London exchange has already honored this development with a rise in stock prices. Within a short time the value of a 25-pence share rose from 30 to more than 60 pence. In the first 6 months sales increased by 5 percent to 335 million pounds (318 million pounds last year). Stringent measures to increase efficiency and an extension of the product line contributed to this positive development of business, despite a continuing recession in many countries of the world. ICL Germany, with offices in Nurnberg, will make its contribution to the expected positive annual result. The company's reorientation toward microcomputers and computer facilities for small- and medium-size businesses, in particular, is to bring about a turnaround in sales. Another measure which was just announced is scheduled to contribute to the long-term recuperation of the company. In the near future, ICL will acquire all of the interest in Computer Leasings Ltd. [CLL]. [Text] [Frankfurt/Main ELEKTRIZITAETSWIRTSCHAFT in German 30 Aug 82 pp 599-600] 9544

CSO: 3698/97

ENERGY

EXPERTS SAY DUTCH-MADE INDUSTRIAL-SCALE FBC PROJECT NEEDED

Rijswijk PT/AKTUEEL in Dutch 15 Sep 82 p 1

[Article by Bert Bosker: "Fluidized-bed Combustion Requires Demonstration Project"]

[Text] Money must soon be made available for facilitating the importation of fluidized-bed combustion boilers for the industry. These, now providing the only method for burning-out coal, are already competing with the traditional pulverized cool and grate boilers. However, trade and industry must be helped to get over a certain initial fear and it is for this reason that a point of reference project at an industrial scale is urgently necessary. By means of this it will be possible to demonstrate that fluidized-bed combustion is not any more expensive, but on the other hand, a lot cleaner. A demonstration project is also very important for the future of the Dutch boiler industry, because there are no other but U.S. industries which can build these boilers at a competitive price.

The foregoing is the opinion of Engineer M.L.G. van Gasselt, the project leader for coal research at the Organization for Applied Scientific Research in Apeldoorn. He expressed this view last week in the course of a symposium on fluidized-bed combustion organized by the above scientific research organization for the industry.

For sometime the Organization for Applied Scientific Research has maintained a demonstration boiler with a capacity of 4 megawatts in which coal is burned with the aid of the atmospheric fluid-bed technology. According to Van Gasselt it has already been possible to demonstrate in a short time that the emission standards, which are going to be applicable for air pollution control, are going to amply attainable with the help of this boiler. On the basis of the experiments carried out by the Organization for Applied Scientific Research the supplier, Stork Ketels, can now supply boilers which are no more expensive than the traditional installations.

According to Van Gasselt, in order to convince trade and industry of this advantage, it is necessary to have a point of reference project and the Ministry of Economic Affairs must make available the money necessary for this. Even the Stork Ketels director, Engineer K. van Duinen, is pushing strongly for a demonstration project at an industrial scale.

No Problems

In the meantime the test installation at the Organization for Applied Scientific Research has gained more than 2,000 hours of operating experience. The conclusion of the researchers is very positive: It is possible to keep the boiler in continuous operation and unmanned without any problems provided the coal is fed by pneumatic means. This means that the coal granules must not be greater than 6 mm in size and the moisture must not be greater than 3 to 4 percent. Thus a pre-processing of the coal for the pneumatic feeding is necessary. Damp and larger size coals (as supplied to the factory) can be fed with the aid of an helix, but this process is not yet meeting the wishes of the Organization for Applied Scientific Research. Work for improving this process is also in progress so as to make it possible to achieve atmospheric fluidized-bed combustion without the need of subjecting the coal to a pre-processing.

Up until now the experiment has shown that a boiler embodying the fluid-bed technology can attain a combustion efficiency of 94 to 96 percent. The emissions of sulphurdioxide and nitrogenoxydes are well within the values desired: respectively 185 and 150 gram per gigajoule. The experiments of the above scientific research organization have even lower emissions as their objective. Van Gasselt is very optimistic about the jetsam of matter (volatile ash): "That is still only a question of better and payable filters and then an absolutely clean combustion is possible." He finds that the problem of processing the ash has been pretty-well beaten and even calls volatile ash "good stuff" which can be put to very good use for all kinds of purposes in construction.

The cost of fluidized-bed combustion boilers are now at about the same level as those of the traditional pulverized coal installations. However, the experiments' aim is to lower this cost by at least 10 percent.

A demonstration project for fluidized-bed combustion is moreover already in progress at the Energy Experimentation Center (ECN) in Petten; but this is on too small a scale for industry (2 mW) and is being used for the central heating system.

In October the first fluidized-bed boiler at an industrial scale in Holland will be put in operation at Shell in Europoort. The boiler has a capacity of 47.5 megawatts, but this is not made in Holland. Its manufacturer is the U.S. Foster Wheller industry.

Up until now the experiments have been aimed mostly at large boilers (30 to 80 mW) and on behalf of the industry; however, there may well be a large requirement for smaller boilers, for example in agriculture and gardening. Moreover, in the near future a market study will be undertaken by the Organization for Applied Scientific Research, probably in collaboration with NEOM [sic] and system builders, to look into the possibilities for small boilers. There certainly are some pretty good possibilities. Engineer A.G. Melman of the above scientific research organization says: "Although the energy consumption of small consumers is only about 20 percent, when expressed in quantities this represents about 95 percent of the total market for boilers."

7964
CSO: 3698/106

SODETEG-TAI CONCENTRATES ON CAM, AUTOMATED FACTORIES

Paris ELECTRONIQUE INDUSTRIELLE in French 15 Sep 82 p 18

[Article by R.S.: "Priority for Flexible Shops"]

[Text] With about 10 projects underway involving flexible shops, the company Sodeteg [Technical Research and General Enterprises Company]-TAI [expansion unknown] (Thomson group) has to a large extent directed its efforts toward automated shops and computer-assisted manufacturing (CAM). The best known project is certainly the flexible shop of Renault-Vehicules-Industriels at Boutheon for which Sodeteg-TAI designed and built the transportation system. In addition, the company has also designed the software for a SNIAS [National Industrial Aerospace Company] surface treatment shop at St Nazaire where the computer system manages the production lines, orders the passage of various parts through the antirust baths, optimizes transportation and monitors product quality. Another accomplishment is the control of machining programs and remote loading of numerical control for 48 drills at SNIAS in Nantes.

Despite participation in these projects, Sodeteg-TAI has still never supervised the building of complete turnkey workshops. That is what the company is going to devote itself to henceforth, including on the international market, as its general director, Mr Bertin, announced recently at a press conference. In addition to its experience, Sodeteg-TAI has acquired expertise which is concretized in a system of industrial simulation capable of assisting in decisions about productivity gains, planning dimensions of facilities, logic, reliability and optimization of production shops. However, while Sodeteg-TAI appears to be turning toward large firms, the company is not forgetting the PMI [small and medium industries] since it is currently developing a modular "systems product" which will be for companies wanting to equip themselves with CAM.

Moreover, while Sodeteg-TAI is devoting its efforts to CAM, it is not neglecting its activities in the energy field which were reflected in 1981 by obtaining a contract for over Fr 100 million for supplying the Brazilian national electricity dispatching. Likewise in transportation, Sodeteg-TAI, after having won the contracts for the centralized control of subway lines in Mexico City and Caracas, is undertaking a series of studies in an attempt to become involved in the principal subway projects being prepared in the

world, specifically in Algiers, Singapore, Cairo, Bogota, Monterrey or Kuala Lumpur. Finally, in the field of data transmission, the objectives of the company are still oriented toward the realization of large systems for automatic message delivery. The principal applications in question concern the transactional systems for press agencies (placing the system designed for the TASS agency in service), switching and meteorological data processing centers and systems for civil aviation.

9969
CSO: 3698/115

STUDY SHOWS INDUSTRY DOES NOT DEVOTE ENOUGH EFFORT TO R&D

Paris AFP SCIENCES in French 16 Sep 82 pp 6-9

[Article: "French Industry Does Not Devote Enough to Research, Says National Credit Study"]

[Text] In the situation of worldwide economic crisis, complicated by changes taking place, France owes it to itself to make the most of its scientific and technical potential to some degree its "ideas" [reference to 1975 advertising campaign which said "We don't have oil, but we have ideas"] if it wants to prepare the future. In this context, "the role played by research and innovation appears to be entirely fundamental," according to a Bulletin de Credit National Study carried out on 300 companies and published recently.

The government has recently shown its intention to increase the portion of the gross domestic product devoted to research. It should reach 2.5 percent in 1985, with a 0.5 percent increase over the present amount. An annual increase of 8 percent (volume) in R&D expenses in industrial firms is also foreseen.

From the study cited, it appears that in France the portion of the GDP (Gross Domestic Product) devoted to research has remained about 1.8 percent for the last 10 years, "but maintaining this rate overall was possible only because of the increase in research carried out in firms while the relative effort of the public sector was regressing." Consequently "in the area of overall research effort, France has not succeeded in retaining its rank compared to that of its principal partners, since it has gone from third to fifth place among the OECD countries."

"Despite recent progress, industry financing of research in France remains below that of our principal competitors." The level of research work done in industry "has remained stable at around 1.1 percent of the GDP, or a percentage that is also lower than that of most of the large industrialized countries.

"The research expenditures of French firms," adds the National Credit study "are approximately half those in Japan and the FRG and a sixth those in the United States.

"The number of researchers employed in French firms is scarcely half the number employed in German firms and 13 times less than those employed in American firms... Research carried out in French firms tends to be concentrated in a small number of sectors for which it represents more than 15 percent of the value added (aeronautical construction, pharmaceutical industry, electronic data processing equipment) while it is very low in numerous branches which are, nonetheless, important economically (mechanical construction, textiles, agro-food industry).

Sixty percent of the total industrial research expenditure incurred in France is in large firms (more than 5,000 employees), with the PME (small and medium firms) spending only 10 percent of the total.

Almost as a consequence, more than 60 percent of the potential for research in industry is concentrated in the Paris region.

The National Credit study deems the following as necessary to increase the research effort of French industrial firms:

1) Train researchers. If industrial research has approximately 32,000 researchers, the total annual need, accounting for replacements, is about 5,800 persons.

2) Strengthen financial measures to encourage industrial research, increasing funding affected by the slant of the concerted actions of the DGRST [General Delegation for Scientific and Technical Research] for example, the premium for innovation accorded by ANVAR (National Agency for the Promotion of Research) should increase to 35 or even 40 percent and be modifiable depending on the size of the firm.

3) Promote collaboration between private and public research.

4) Promote collaboration between large firms and PME.

5) Increase the multidisciplinary nature of technical centers.

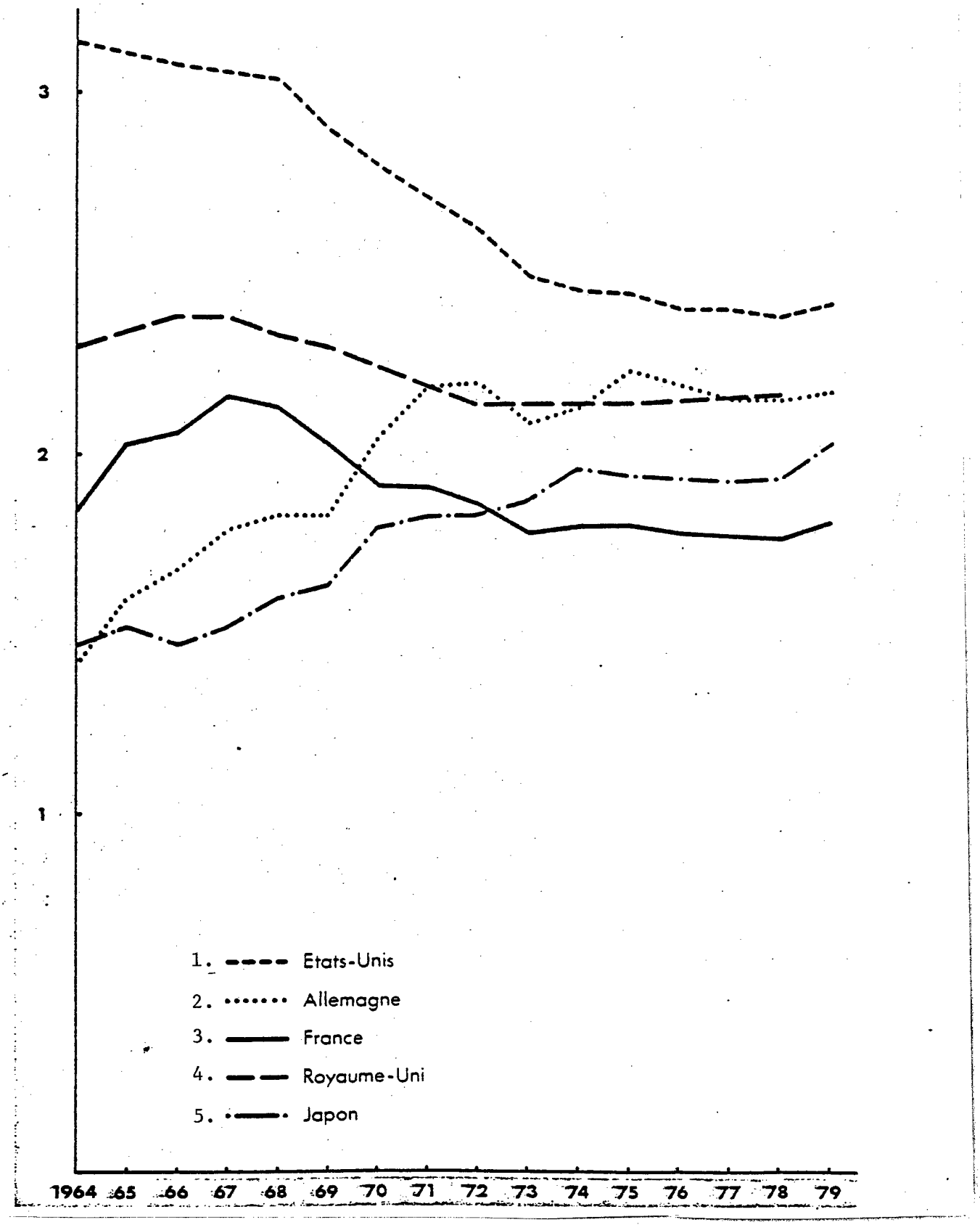
6) Improve the relationships between research and marketing departments within companies and make these relationships closer.

Key to figure on following page:

EVOLUTION OF NATIONAL RESEARCH EXPENDITURES AND ITS COMPONENTS AS A PROPORTION OF THE GDP

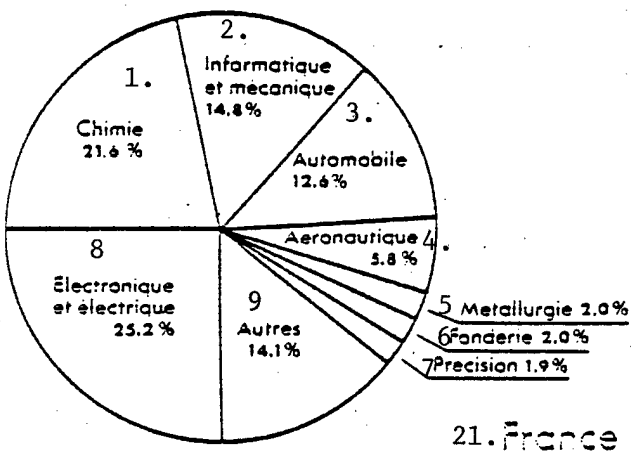
1. United States
2. Germany
3. France
4. United Kingdom
5. Japan

EVOLUTION OF NATIONAL RESEARCH EXPENDITURES AND ITS COMPONENTS AS A PROPORTION OF THE GDP

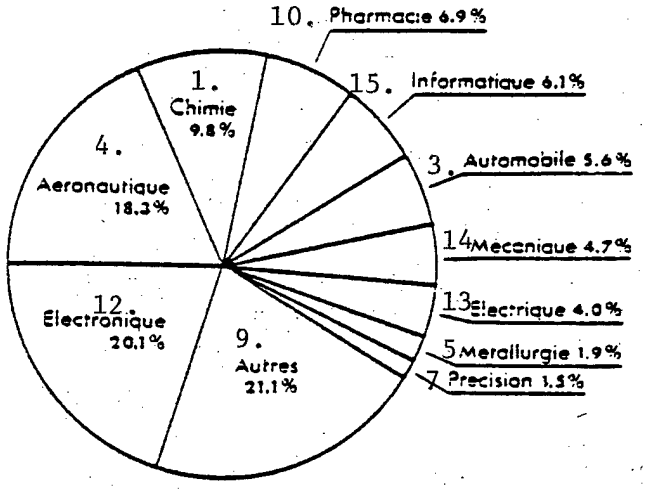


DISTRIBUTION OF DOMESTIC RESEARCH EXPENDITURES OF FRENCH AND FOREIGN FIRMS IN 1979, BY BRANCH

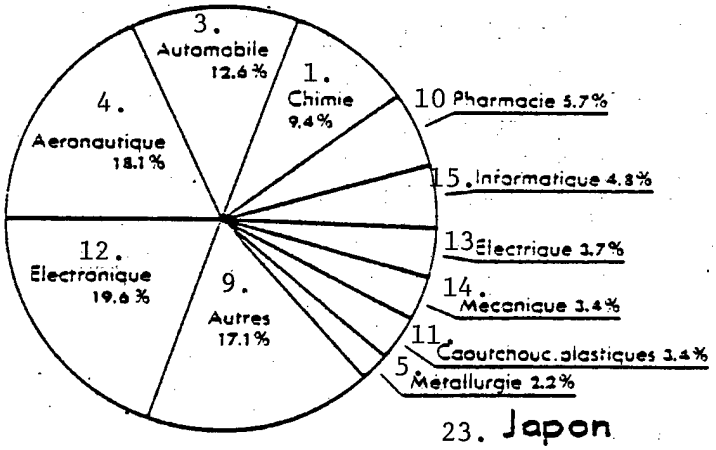
19. Allemagne fédérale



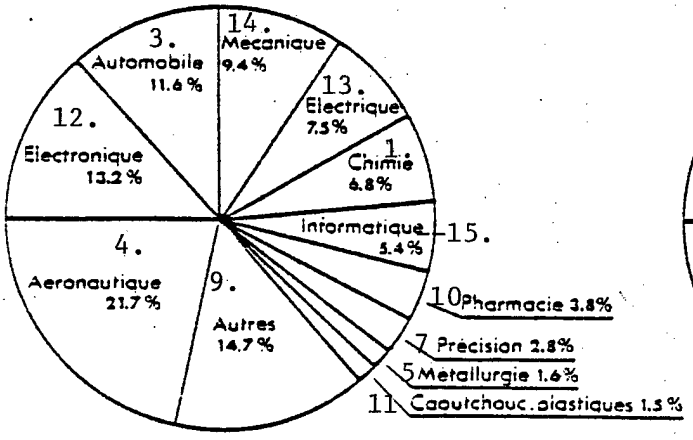
20. Royaume-Uni(1978)



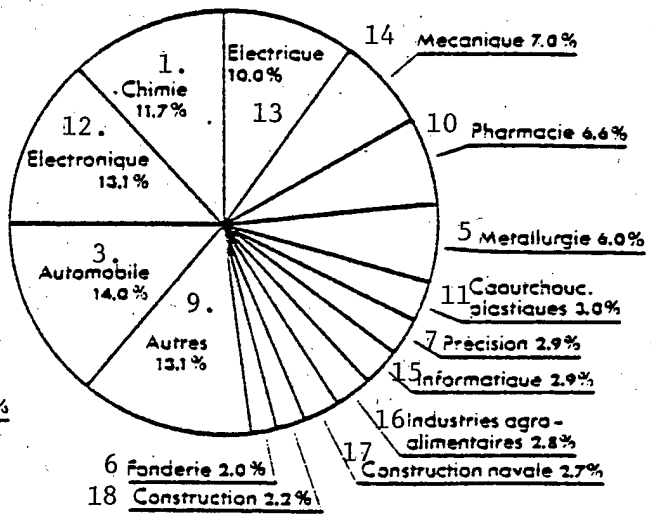
21. France



22. Etats-Unis



23. Japon



Key to chart on previous page:

DISTRIBUTION OF DOMESTIC RESEARCH EXPENDITURES OF FRENCH AND FOREIGN FIRMS IN 1979, BY BRANCH

1. Chemistry
2. Computers and Mechanical
3. Automotive
4. Aeronautical
5. Metallurgy
6. Foundry
7. Precision
8. Electronics and Electrical
9. Other
10. Pharmaceutical
11. Rubbers and Plastics
12. Electronics
13. Electrical
14. Mechanical
15. Data Processing
16. Agro-food Industries
17. Shipbuilding
18. Construction
19. Federal Republic of Germany
20. United Kingdom (1978)
21. France
22. United States
23. Japan

9969
CSO: 3698/113

ANVAR SUPPORTS SMALL-COMPANY INNOVATION

Paris LE NOUVEL ECONOMISTE in French 1 Nov 82 pp 44-45

[Article by Sophie Seroussi]

[Text] ANVAR [National Agency for Valorization of Research] will distribute 900 billion francs in 1983 in the form of grants and subsidies. At the Agency Conference in Nantes, the prime minister announced new fiscal measures for innovative companies. A tax credit will be instituted and companies will henceforth be able to deduct from their taxes 25 percent of the increase in the volume of their research expenses, which include: net allocations for amortizations, expenses for research personnel and the construction of prototypes and pilot installations, operating expenses and, finally, expenses for outside research studies and for taking out patents on inventions. With a ceiling of 3 million francs for each company, this renewable tax measure will be effective for 5 years. Beginning in 1984, it should provide additional aid of 400 million francs.

Thus the prophetic figure--often cited by Mr Chevenement--of 5,000 French companies involved in research (instead of 2,000 as at present) should be reached by 1985. At least this is what is hoped at the Ministry for Research and Industry, where it is felt that "this tax credit constitutes an indispensable support of budgetary aid measures for achieving the lofty goal of growth of the research and development effort of corporations, set at 8 percent annually."

Initiative

Mr Jean Granet, sales manager of the Cucco Company, near Clermont-Ferrand, explains: "I am afraid that this tax credit will particularly benefit large companies which have a sizable research program. The turnover of capital of a PMI [small or medium-size industry] such as ours (30 employees, turnover of 6.5 million) is not large enough." Cucco is a typical example of an innovative company, however. Specializing in boilermaking, this company has existed comfortably in Michelin's shadow since 1968. It decided on its own to diversify, believing that its products did not have enough added value. From its "big pots," it has developed sophisticated apparatus: types of automated autoclaves. They are intended for large-scale industrial kitchen facilities and for the pharmaceutical and cosmetic industries. Today, Cucco's customers are Bonduelle, Buitoni, Findus, Roussel-Uclaf. Tomorrow, they will perhaps be Bel or

Elf-Bio-industries. With slight modification, these kitchen utensils can become excellent reactors, essential to fermentation processes in industrial production based on biotechnologies.

At ANVAR's Conference, it so happened that this company was looking for industrial partners and capital for investing. Mr Granet, wearing a smile, obviously departed satisfied with the contacts made. He liked the expression "American-style agreements." It took him about 10 minutes to explain his "process" to the "Technologies Exchange." And just as long to convince people of the validity of his development plan near the ring of the "Capital Exchange." And the 500 francs invested in a stall for 2 days was probably largely paid off. A loyal customer of ANVAR, our sales manager remains suspicious of the demonstrations of "enthusiasm" by bankers: "I would not hesitate between a passive partner and an active partner who supplies an innovative company with his own funds in order to help it to reach a higher level of development."

Often taken to task by the company heads present in Nantes, French bankers were thus reproached for liking risk-free innovation too much. Mr Bernard Daude, general manager of Inodev (guaranty fund for developing innovation), himself acknowledges that "major technological innovations, by definition, occur without it really being possible to plan them far in advance. For a company to be able to adapt, it needs rapid financing procedures." Mr Jacques Martinat, P-DG [president-general manager] of Metravib, adds: "This is not really the case in France. The establishment of a tax credit is symptomatic of administrative unwieldiness. Tax measures have never been the best way to act quickly."

Mr Martinat is in a good position to know. With 150 employees and a turnover of 55 million francs, Metravib has made a name for itself in an ultramodern technology, the measurement and handling of vibrations and noise, based on its own research. Mr Martinat explains: "In a field with which I am quite familiar, mechanics, 2 years ago I did not foresee such a massive introduction of data processing into our jobs. If I don't invest very quickly, it will be too late afterwards. The slots will be taken."

A new measure being studied by the government: the establishment of specific interest rates for investments, like those which already exist for agriculture and housing. By accelerating the decline of interest rates, this measure would quite obviously favor the industrial productive apparatus. This measure must also be implemented quickly.

11915
CSO: 3698/103

'AUTO 2000' PROGRAM RESULTS REVIEWED

Duesseldorf VDI NACHRICHTEN in German 17 Sep 82 p 8

[Article by Olaf von Fersen: "The Automobile of Tomorrow"]

[Text] Automobiles which were developed during or after the two "oil crises" display to an increasing degree the criteria of innovation for the automobile of tomorrow: small drag areas in keeping with the vehicle classes, drive designs with new and optimized technology, weight savings with light materials, yet retaining safety and driving comfort. The goal is to make the best use of energy and to keep environmental pollution low. The industry is striving for this through research and development. A series of articles will cover the "Auto 2000" project for which proposals had been sought by the BMFT [Federal Ministry for Research and Technology] as well as the efforts on the part of European industry in respect to the "automobile of tomorrow." In the following the "Auto 2000" is introduced and an attempt made to evaluate it.

It is surely in the interest of industry if the state provides financial support for certain costly projects which serve technical progress, but as such are not absolutely vital for the business supported. It is also surely in the interest of the state to press forward with research projects which can contribute to the heightened reputation of the country's industry or can also serve as arguments for certain political or economic considerations. What exactly motivated the initiators of the "research automobile" project can never be fully clarified with certainty after the fact. When the BMFT solicited proposals for the research project at the beginning of 1978 it was to serve the "Demonstration of Automotive Research Results of Integrated Concepts of Experimental Passenger Cars." Further, it was announced that "against the background of economically significant guaranteeing of a long-term technological lead on the part of the German automobile industry" the results of the project were to "show decisive improvements in respect to today's mass-produced vehicles and point out directions for future research tasks." Accordingly the BMFT evidently wanted to point the way to the automobile manufacturers along which they should move forward in terms of technology.

Weight Classes Cause Criticism

The request for proposals contained basic technical conditions and a precise schedule for submitting the specifications of the planned designs, for their evaluation and selection by the BMFT, for design and development, for manufacturing and testing prototypes of the vehicles manufactured by those participating in the project. At this point two details in the request for proposals cannot be ignored which surely provide bases for criticism of the overall project:

The considerations by the experts at the Ministry were based on the technical and economic situation of 1978 to have automobile prototypes designed which aim beyond 1990. But the weight classes in the request for proposals are nowadays no longer up to date and cause obstacles. For the three scheduled "categories" of research automobiles provision was made for allowable total weights of 1,250 kg, 1,700 kg and 2,150 kg, which may in fact still be acceptable today, but appear to be too high for the end of the decade.

The idea of developing an "automobile of the future" within a period of not even 3 years, from a proposal to an operational automobile, can only be realized if the "research" aspect is interpreted in such a way that existing experimental units which are usable for the project are utilized in the research departments.

The BMFT promised support amounting to about DM110 million for the overall project. This was to cover half the costs occurring. The other half was to be put up by the project partners. To come right to the point: The Federal funds for the research project were reduced to about DM70 million prior to its completion. Therefore, various interesting subprojects had to go undone and unfortunately this included the scheduled final phase of the official testing of the vehicles. The industry will also no longer be able to complete the safety tests which were part of the original planning because the number of vehicles originally planned for had to be drastically reduced and no company would be willing to destroy in collision tests an experimental vehicle for which it invested many millions and of marks and thousands of hours of work by highly trained staff employees.

Yet the project cannot be labled "a shot in the dark" because the intensive work in areas which were often outside the economically rigidly defined routine provided a number of important findings and experiences, many of which will surely be reflected in ongoing series production in the years to come.

Automobile manufacturers Audi, BMW, Daimler-Benz, Porsche and VW responded to the BMFT's call. An advanced school team joined them as a rank outsider. But then BMW and the Porsche Co withdrew their proposals. The advanced school project actually was not qualified to participate according to the call for proposals because it was not able to satisfy the conditions of 50-percent financing and the prospect of later utilizing in series production the findings obtained with the research car. The specifications of the university group, however, were found to be so interesting that 100-percent financing was promised by the BMFT and the specifications accepted.

The manufacturers decided as follows:

--Audi for a 4-door sedan, the size of the type 100, with a supercharged 4-cylinder gasoline engine, displacement 1.6 liters;

--Daimler-Benz also for a 4-door sedan of the superior class with three engine choices, gasoline, diesel and gas turbine;

--Uni-Car for a 4-door sedan approximately the same size as Audi's. A turbo-diesel with direct injection functions as the drive;

--VW for a 2-door sedan in the Golf style, optionally with gasoline, diesel or alcohol engine; the first two have supercharging.

Reduction in Support During the Unveiling

One day before the opening of last year's International Automobile Show (IAA) in Frankfurt the more or less finished research automobiles were presented to the public by Minister for Research and Technology Andreas von Buelow, whose predecessor, Dr Volker Hauff, had started the project. The minister used this opportunity to announce the reduction in support for the project from the originally agreed upon DM110 million to about DM70 million. Several of the representatives of the industrial companies involved in the project appeared unpleasantly surprised by the announcement, yet the reduction actually could be anticipated because of the well known miserable state of Federal finances at this point in time.

A BMFT spokesman at that time provided the following information concerning the distribution of the support funds: Audi DM5 million, Daimler-Benz DM20 million, advanced school project Uni-Car DM32 million and VW DM17 million. As a sole project partner, apparently only the advanced school group can dip into the state purse on a limited scale because it does not have its own funds with which even a severely reduced project could be completed. Although several very remarkable vehicles were developed during the entire affair and the project partners were surely able to gather experiences and findings with the help of state support, findings which otherwise would hardly have been allowed them so directly, if nonetheless does leave a somewhat bitter aftertaste. One wonders whether it can be the business of the state to want to influence automobile technology by calls for proposals which are accompanied by financial incentives.

The "Auto 2000" models which were proudly presented at the IAA and whose technical innards have scarcely reached the level of being ready for series production awakened in many visitors the notion that the industry can produce such neat economy cars today, but nonetheless palms off on its customers old models produced at greater profit. The extensive acceptance of the new styles was highly noteworthy; this also applies to the advanced school project "Uni-Car" which will be described in the next article. Yet in this regard it must be said that in contrast to the "automobiles of the future" which had been presented earlier at the large automobile shows by diverse "styling authorities," these models, supposedly of the year 2000 because of their functionality, had a realistic and convincing effect.

12124
CSO: 3698/117

STATUS REPORT ON MAGNETIC LEVITATION TRAIN DEVELOPMENT

West Berlin ZEITSCHRIFT FUER EISENBAHNWESEN UND VEKEHRSTECHNIK in German Jul/Aug 82 pp 289-290

[Article by Dr A. Welz, engineer]

[Text] Following the Wheel and Rail Status Seminar, the Ninth Status Seminar on Magnetic Levitation Train Development was held in Titisee on 29/30 April under the direction of Dr Menden, the new director of Subsection 52 of the Federal Ministry for Research and Technology (BMFT) which also includes transportation research. In his introduction Dr Menden said, among other things: The two lines of development in long-distance track-guided transport (wheel/rail technology and magnetic suspension technology) whic have been supported by the Federal minister for research and technology (BMFT) are supposed to be directed at the common goal of identifying a high-speed rail system which is optimal for the demands of the future and in defining its tasks in any future high-speed transport system. By the mid-1980's development along both lines should have progressed to the point of being able to compare systems.

Even though delays have occurred in respect to the original timetable, the progress in construction with the Emsland Transrapid Experimental Facility (TVE) is gratifying. Of course, the funds available for 1982 and 1983 are primarily needed for the first stage of expansion of the TVE (canal route and northern loop) so that in 1982 only DM4.4 million are available for accompanying research and development work. By the end of 1982 the BMFT had supported magnetic levitation train development with approximately DM532 million. Since the magnetic levitation train is designed as a European long-distance transport system, there is hope of European participation in financing the TVE's southern loop. The short stator drive is under continuing development in international cooperation.

The recently established Experimental and Planning Association for Magnetic Levitation Train Systems (MVP), Ltd, in which the German Federal Railways, German Lufthansa and the Industrial Plants Operating Company (IABG) have joined together, is to assume responsibility for operating the TVE and to study and evaluate transport-technical and economic questions of the magnetic levitation train. The further development of the magnetic levitation train will depend on the cooperation between developing industry and the MVP. The TVE is to commence operation in mid-1983.

The following is a report on the situation as presented. This supplements the publications in the technical issue "Magnetic Suspension Technology" of this journal (No 7/8, 1982).

1. TVE

With the March 1979 plan determination public approval was granted for a period of 10 years commencing with the start of operation of the facility.

The pile foundation for the roadway, which in the opinion of an expert was essential because of the soil and other necessary additional outlays resulted in financial bottlenecks and reductions. The experimental facility is approximately 50 to 55 percent completed. A section of roadway about 6 km long between the two switches of the canal route is fully equipped and thus, quite apart from the completion of the entire roadway, is available for activities to start operation of the vehicle commencing spring 1983.

The Transrapid 06 vehicle is under construction in the familiar shape. Following the successful start of the suspension experiments with the first suspension frame on 19 March 1982 and the construction currently in progress at Krauss-Maffei on the vehicle suspension platform, the four suspension frames are to be integrated in the suspension platform and the car body of Section V is to be mounted in fall 1982. Testing and suspension experiments by Section V until February 1983 will be followed by transport to the Emsland and initiation of operation. Section H will follow Section V in 2 months. In the course of development the tolerance situation has gotten worse for the carrying and guidance system, the actual behavior of the carrying magnet with a linear generator proved to be more unfavorable than had been anticipated in theory and the car body, which is elastic at low frequency, has a very strong impact on riding comfort. Thus, it obviously seems to be necessary to leave the facility in the hands of the developer for a longer period of time than previously anticipated.

The electrical equipment for the ironcoated synchronous long stator drive is largely completed, in part even delivered and mounted.

The hardware components of the computer guidance system for the information equipment have been acquired, the programming work is underway. For reasons of economy a number of items had to be deferred. On the other hand, new tasks were added which developed as a result of technical problems which at first were not obvious, as for example, the safety control mechanism for monitoring slipping and swinging forces.

In preparing to start operation it is assumed that the components to be mounted in the Emsland have already been tested at the factory. Thus, the start of operation in the Emsland begins with the interaction of the components in the individual subsystems, such as drive, information or roadway. For these jobs a test vehicle was ordered which has since been available in the Emsland. The central measuring facility is to be operational in fall 1982 while the essential facilities of the experimental center are to be available in summer 1982 so that then the activities for starting operation can be initiated on the TVE itself.

The work by the TUeV [FRG automobile inspection] task force to establish transportation and operation safety is in full swing, focusing on a number of areas such as fire protection or statics of bending switch I or subsystems whereas the systemwide safety tasks must be intensively continued. The professional association of streetcars, subways and railways was called in to monitor accident prevention.

2. The MVP

The TVE will not be operated by the Transrapid magnetic levitation train consortium, but by the MVP which was especially created for this in order to provide, in the opinion of the BMFT, possible future operators of a magnetic levitation train the opportunity to include their demands and desires in the last phase of development, and on the other hand not to leave to one group the development and evaluation of the magnetic levitation train product on the basis of the measuring data.

All rights and obligations are clearly stipulated in the management agreement between the consortium and the MVP for the planning, implementation and evaluation of the experiment.

The three MVP partners have divided the work to be done in such a way that the management and economic tasks will be handled primarily by Lufthansa, transportation technology primarily by the Federal German Railways and experimental technology primarily by the IABG. The MVP will become active more in coordination and evaluation. Extensive work is to be implemented via the MVP's subcontract.

The Transrapid magnetic levitation train consortium remains responsible for the development and further development of the magnetic levitation train system; it must also undertake the marketing of its product.

3. Technology Program

The project design of a magnetic levitation train system, which was developed by the "Ems Short Stator System Development Association" and which has combined carrier/guidance equipment and an asynchronous short stator linear motor drive is aimed at reducing investments for roadway equipment. With the new self-centering carrier-guidance system with a double-comb linear motor, substantial progress was achieved; the carrier-guidance structure, which is being built smaller, also effects a substantially lower drag. A number of changes, as for example use of boiling cooling for the power semiconductors of the inverter make possible the required reduction in the vehicle's weight and also provide space for baggage containers beyond that needed to house the instrument equipment.

Further, there was a report about the status of development and the results for improving the long stator coil and about system designs with alternative drives, the asynchronous short stator compact motor with a U-shaped reaction rail and

the double-excited synchronous linear motor. With the Guimbal linear motor system, experiments in keeping with the cooperation agreement between the French Ministry of State for Transportation and the BMFT are to start at the end of 1982 on the rotation test stand in Grenoble.

For later testing or for operating the magnetic levitation train an operation guidance system is required which controls and insures movement. For the route in question, Hamburg-Hannover, appropriate studies were implemented so that a specific system design can now be set up following the operational and technical specifications for the future transport system. It is desirable to be able to include equipment testing in the experiments on the TVE.

For licensing the magnetic levitation train, the task force which was established for this purpose, has prepared, under the cooperation of the Lower Saxony Ministry for Economics and Transportation, a suitable procedure in which the previously mentioned work of the TUeV task force plays an important role. Further, a first design of the technical bases of a regulation on magnetic levitation train construction and operation is to be completed in mid-1982.

4. International Cooperation and Applications

Since 1978 there has been very close cooperation between the FRG and France which in part was already mentioned. Further, the influence of the external vehicle shape on the aerodynamics was studied, keeping the points of view of designers in mind. Negotiations on cooperation are presently in progress with Japan which is interested in short stator magnetic levitation train technology.

Cooperation between German and U.S. firms based on agreements between the BMFT and the Department of Transportation (DOT) has meanwhile been terminated for financial reasons. For Canada, setting up a use study on the use of the magnetic levitation train as compared with the advanced wheel-rail system for the Montreal-Ottawa route is planned. At the annual meeting of experts of German and Russian delegations there was an exchange of experiences in the areas of the magnetic levitation train, wheel and rail technology and pipeline transport.

In the context of German-French cooperation at present a planning study on an electromagnetic high-speed rail system between Frankfurt and Paris is being drafted; an extensive report on this will follow in the near future. Further, the magnetic levitation train is to be given consideration in the transport plan currently being developed for Saudi Arabia.

12124
CSO: 3698/117

END